

Space Weather Highlights
06-11 January 1998

Solar activity ranged from low to very low. The sun was spotless during 07 - 09 January. Region 8131 (S24, L = 120, class/area Dri/190 on 12 January) emerged on 10 January as a small B-class sunspot group, then displayed moderate spot growth along with increased magnetic field gradients. The region produced several B-class subflares during this growth phase. Space-based coronagraph images indicated a coronal mass ejection (CME) departed the west limb around 10/2200UT. The CME was slightly inclined to the ecliptic and appeared to be westwardly directed.

Solar wind data were received from the WIND spacecraft a few hours per day. Velocities ranged from 300 - 500 km/sec with the highest velocities observed during 06 and 09 January. Solar wind particle densities generally varied from 02 - 17 p/cc, but briefly increased to near 40 p/cc on 06 and 08 January. Bz was in the plus to minus 05 nT (GSM) range during most of the period, but was mostly south on 06 January with maximum deflections of minus 13 nT. Solar sector orientation shifted from toward to away almost daily.

There were no significant proton enhancements observed at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude reached high levels during the latter half of 10 January. Otherwise, fluxes were moderate to normal.

The geomagnetic field was quiet on 05 January. The field became disturbed during 06 - 07 January, most likely due to a halo coronal mass ejection observed on 03 January. Active to minor storm levels occurred at middle latitudes during the disturbance. Brief major storm periods occurred at high latitudes as well. Activity declined to mostly quiet to unsettled levels for the remainder of the period.

Space Weather Forecast
14 January 1998 - 09 February 1998

Solar activity is expected to be mostly low. Isolated C-class flare activity is expected. M-class flare probabilities are expected to increase during 16 - 29 January due to the return of old region 8124.

No significant proton enhancements are expected at geosynchronous altitude.

The greater than 2 MeV electron flux at geosynchronous altitude is expected to be at normal levels during most of the period.

The geomagnetic field is expected to be quiet to unsettled. However, brief active periods may occur during 16 - 17 January in response to CME effects.



Daily Solar Data

Date	Radio Flux	Sun spot	Sunspot Area	X-ray Background	X-ray Flux			Flares				
	10.7 cm	No. (10 ⁶ hemi.)	(10 ⁶ hemi.)		C	M	X	S	1	2	3	4
05 January	89	22	50	A9.4	1	0	0	0	0	0	0	0
06 January	87	23	20	A6.5	0	0	0	0	0	0	0	0
07 January	85	0	0	A5.0	0	0	0	0	0	0	0	0
08 January	82	0	0	A3.8	0	0	0	0	0	0	0	0
09 January	82	0	0	A2.9	0	0	0	0	0	0	0	0
10 January	81	14	10	A1.8	0	0	0	1	0	0	0	0
11 January	85	51	40	A1.9	0	0	0	0	0	0	0	0

Daily Particle Data

Date	Proton Fluence (protons/cm ² -day-sr)			Electron Fluence (electrons/cm ² -day-sr)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
05 January	1.9E+5	1.8E+4	4.6E+3		2.5E+5	
06 January	4.5E+5	1.8E+4	4.5E+3		2.8E+5	
07 January	1.3E+5	1.7E+4	3.9E+3		2.2E+6	
08 January	2.8E+5	1.7E+4	4.1E+3		4.0E+6	
09 January	2.6E+6	1.8E+4	4.4E+3		1.7E+7	
10 January	1.6E+6	1.7E+4	4.5E+3		4.9E+7	
11 January	7.6E+5	1.8E+4	4.4E+3		3.4E+7	

Daily Geomagnetic Data

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
05 January	4	1-0-0-1-2-2-2-1	1	0-0-0-1-0-1-1-0	2	0-0-0-1-1-2-1-1
06 January	16	3-3-2-1-3-4-3-4	9	0-1-1-0-2-5-2-2	14	3-3-1-0-3-4-3-3
07 January	19	4-5-4-4-2-2-2-1	*	4-4-5-6-3-*-0-0	29	5-6-4-5-3-1-1-1
08 January	7	0-0-2-2-2-3-2-3	9	0-0-0-3-4-3-1-2	7	0-0-1-2-2-2-3-3
09 January	9	2-1-2-3-3-3-2-1	9	0-0-3-4-4-1-0-0	9	2-1-3-3-3-3-1-1
10 January	7	2-2-2-1-3-2-1-1	8	0-0-2-5-1-2-0-0	6	1-2-2-2-3-2-2-1
11 January	7	2-2-2-1-3-2-1-1	5	0-0-3-0-4-1-0-0	6	2-2-3-2-3-2-1-2

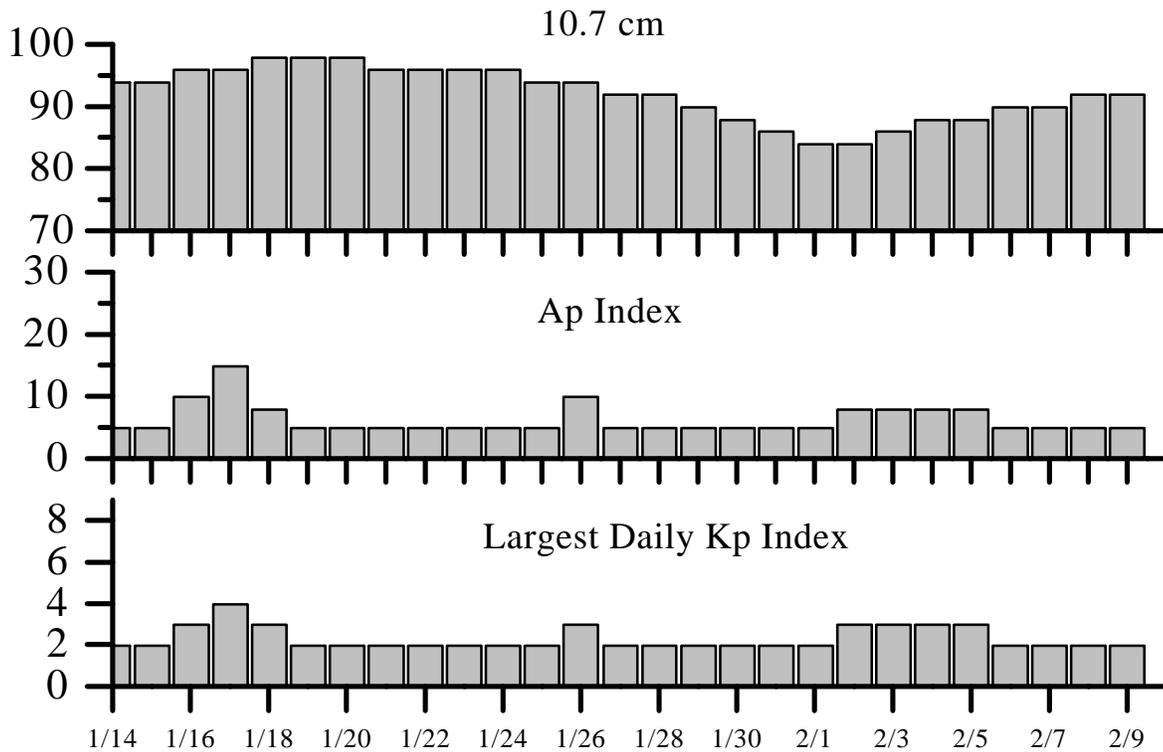


Alerts and Warnings Issued

Date and Time of Issue (UT)	Type of Alert or Warning	Date and Time of Event (UT)
05 Jan 1405	Stratwarm Alert exists Monday	
06 Jan 0305	K= 4 observed	06 Jan 00 - 03
06 Jan 1319	Stratwarm Alert exists Tuesday	
06 Jan 1813	K= 4 observed	06 Jan 15 -18
07 Jan 0602	A \geq 20 observed	07 Jan 0600
07 Jan 0602	K= 5 observed	07 Jan 03 - 06
07 Jan 1354	Stratwarm Alert Exists Wednesday	
08 Jan 1321	Stratwarm Alert Exists Thursday	
09 Jan 1426	Stratwarm Alert Exists Friday	
10 Jan 1232	Stratwarm Alert Exists Saturday	
10 Jan 1719	>2MeV Electron Event \geq 1000pfu	10 Jan 1655
11 Jan 1316	Stratwarm Alert Exists Sunday	



Twenty-seven Day Outlook



Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index	Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index
14 Jan	94	5	2	28 Jan	92	5	2
15	94	5	2	29	90	5	2
16	96	10	3	30	88	5	2
17	96	15	4	31	86	5	2
18	98	8	3	01 Feb	84	5	2
19	98	5	2	02	84	8	3
20	98	5	2	03	86	8	3
21	96	5	2	04	88	8	3
22	96	5	2	05	88	8	3
23	96	5	2	06	90	5	2
24	96	5	2	07	90	5	2
25	94	5	2	08	92	5	2
26	94	10	3	09	92	5	2
27	92	5	2				



Energetic Events

Date	Time (UT)			X-ray		Optical Information			Peak		Sweep Freq		
	Begin	Max	$\frac{1}{2}$	Class	Integ Flux	Imp Brtns	Location		Rgn #	Radio Flux		Intensity	
			Max				Lat	CMD		245	2695	II	IV

No Events observed

Flare List

Date	Time			X-ray Class.	Optical Imp / Brtns	Location Lat CMD	Rgn #
	Begin	Max	End				
05 January	0148	0159	0227	C1.2			
06 January	No Flares Observed						
07 January	No Flares Observed						
08 January	No Flares Observed						
09 January	No Flares Observed						
10 January	1816	1819	1822	B3.3	SF	S27E21	8131
	2000	2013	2019	B3.3			
	2222	2226	2229	B2.7			
	2335	2341	2352	B9.6			
11 January	0324	0332	0334	B5.8			
	0545	0554	0559	B5.3			



Region Summary

Date	Location		Sunspot Characteristics				Flares														
	(° Lat ° CMD)	Helio	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical										
		Lon						C	M	X	S	1	2	3	4						
<i>Region 8126</i>																					
23 Dec	N20E79	309	0100	03	HHX	001	A														
24 Dec	N21E66	309	0160	03	HHX	001	A							1							
25 Dec	N21E54	308	0160	03	HKX	001	A														
26 Dec	N20E41	308	0200	03	CHO	002	B														
27 Dec	N21E28	307	0180	03	HSX	003	A														
28 Dec	N22E16	305	0210	05	CHO	008	B														
29 Dec	N19E05	303	0230	03	DKO	007	B							1							
30 Dec	N21W10	305	0220	04	HKX	007	BG														
31 Dec	N21W24	307	0240	06	CHO	007	B	1						2							
01 Jan	N22W38	308	0210	04	CKO	006	B														
02 Jan	N20W51	307	0180	05	DAO	009	B	1						2							
03 Jan	N21W62	305	0150	05	DAO	007	B							1							
04 Jan	N22W74	304	0110	08	DAO	007	B														
05 Jan	N23W91	308	0040	02	HSX	001	A														
								2	0	0	0	7	0	0	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 303

<i>Region 8129</i>																					
29 Dec	N28E36	272	0010	02	BXO	003	B														
30 Dec	N28E23	272																			
31 Dec	N29E12	271	0000	00	AXX	001	A														
01 Jan	N29W01	271																			
02 Jan	N29W14	271																			
03 Jan	N29W27	271																			
04 Jan	N29W40	271																			
05 Jan	N23W54	271	0010	00	AXX	001	A														
06 Jan	N24W66	270	0010	02	AXX	002	A														
07 Jan	N24W79	270																			
08 Jan	N24W92	270																			
								0	0	0	0	0	0	0	0	0	0	0	0	0	

Crossed West Limb.

Absolute heliographic longitude: 271



Region Summary- continued.

Date	Location		Sunspot Characteristics				Flares										
	(° Lat ° CMD)	Helio	Area (10 ⁻⁶ hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
		Lon						C	M	X	S	1	2	3	4		
<i>Region 8130</i>																	
29 Dec	S29E30	278	0020	04	BXO	005	B										
30 Dec	S29E16	279	0050	06	DAO	011	B										
31 Dec	S29E03	280	0070	07	DAO	010	B										
01 Jan	S29W11	281	0070	07	DSO	013	B										
02 Jan	S28W23	279	0050	07	DSO	010	B						1				
03 Jan	S28W35	278	0010	06	BXO	004	B										
04 Jan	S28W47	277	0010	08	BXO	003	B										
05 Jan	S28W60	277															
06 Jan	S29W64	268	0010	00	AXX	001	A										
07 Jan	S29W77	268															
08 Jan	S29W90	268															
									0	0	0		1	0	0	0	0
Crossed West Limb.																	
Absolute heliographic longitude: 280																	
<i>Region 8131</i>																	
10 Jan	S26E19	132	0010	02	BXO	004	B						1				
11 Jan	S24E10	128	0020	11	BXO	006	B										
									0	0	0		1	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 128																	
<i>Region 8132</i>																	
11 Jan	S18E03	135	0010	03	BXO	002	B										
									0	0	0		0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 135																	
<i>Region 8133</i>																	
11 Jan	N04E24	114	0010	00	AXX	002	A										
									0	0	0		0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 114																	
<i>Region 8134</i>																	
11 Jan	N15E73	065	0000	00	AXX	001	A										
									0	0	0		0	0	0	0	0
Still on Disk.																	
Absolute heliographic longitude: 065																	



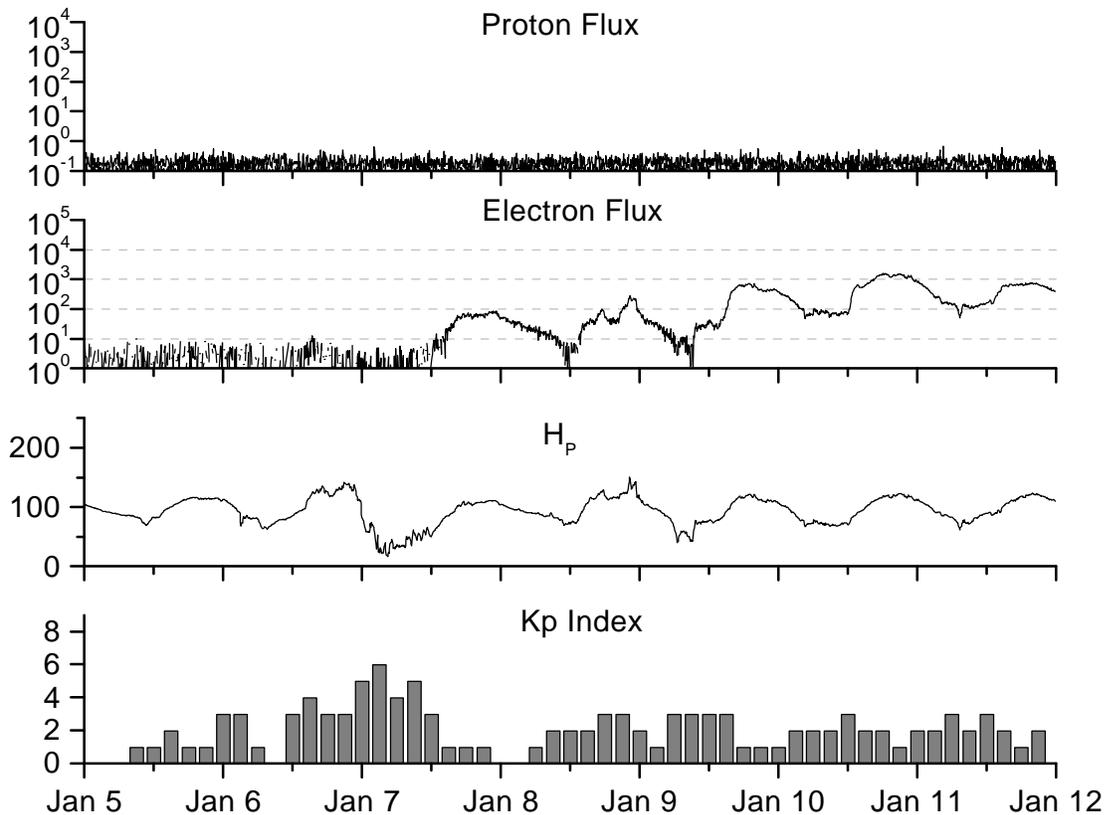
**Recent Solar Indices (preliminary)
of the observed monthly mean values**

Month	Sunspot Numbers				Radio Flux		Geomagnetic		
	Observed SWO	values RI	Ratio RI/SWO	Smooth SWO	values RI	Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
1996									
January	17.6	11.5	0.65	16.8	10.4	74.5	72.4	09	09.8
February	09.1	04.4	0.48	16.2	10.1	71.5	72.2	10	09.8
March	12.1	09.2	0.76	15.4	09.7	72.7	72.1	11	09.9
April	08.5	04.8	0.56	13.6	08.5	69.3	71.6	11	09.7
May	11.8	05.5	0.47	12.9	08.0	72.1	71.4	07	09.5
June	18.8	11.8	0.63	13.5	08.5	69.6	71.8	05	09.4
July	13.2	08.2	0.62	13.4	08.4	71.2	72.0	07	09.3
August	20.5	14.4	0.70	13.1	08.3	72.4	72.1	09	09.4
September	02.9	01.6	0.55	13.3	08.4	69.4	72.3	15	09.3
October	02.3	00.9	0.39	14.0	08.8	69.2	72.6	13	09.1
November	26.7	17.9	0.67	15.4	09.8	78.7	73.0	08	09.1
December	21.1	13.3	0.63	16.2	10.4	77.8	73.3	07	09.3
1997									
January	09.0	05.7	0.63	16.5	10.5*	74.0	73.4	09	09.3*
February	11.3	07.6	0.67	17.4	11.0*	73.8	73.7	11	09.2*
March	14.4	08.7	0.60	20.4	13.5*	73.5	75.1*	08	09.0*
April	24.5	15.5	0.63	24.0	16.5*	74.5	76.8*	10	08.6*
May	28.6	18.5	0.65	26.4	18.4*	74.6	78.4*	08	08.6*
June	22.1	12.7	0.57	29.0	20.4*	71.7	80.1*	07	08.6*
July	17.0	10.5*	0.62*			71.1		06*	
August	36.7	24.7*	0.67*			79.0		08*	
September	52.8	51.3*	0.88*			96.2*		10*	
October	33.6	23.3*	0.69*			85.0*		10*	
November	53.5	39.3*	0.73*			99.5*		10*	
December	57.9	41.5*	0.72*			98.8*		05*	

*Preliminary estimates.

The lowest smoothed sunspot number for Cycle 22, RI = 8.0, occurred May 1996. The highest smoothed sunspot number for Cycle 22, RI=158.5, occurred July 1989. October 1996 has been selected as the start of Solar Cycle 23. From June 1991 onward, the 10.7 cm radio flux data source is Penticton, B.C. Canada. Prior to that, it was Ottawa.





Weekly Geosynchronous Satellite Environment Summary
Week Beginning 05 January 1998

Protons plot contains the five-minute averaged integral proton flux (protons/ cm²-sec-sr) as measured by GOES-9 (W135) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

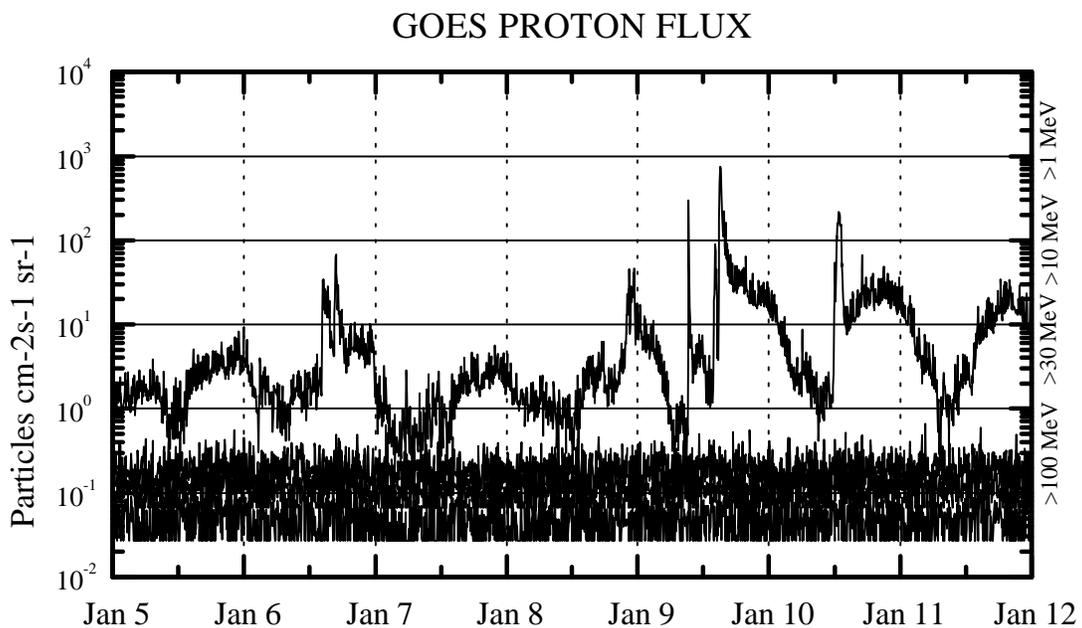
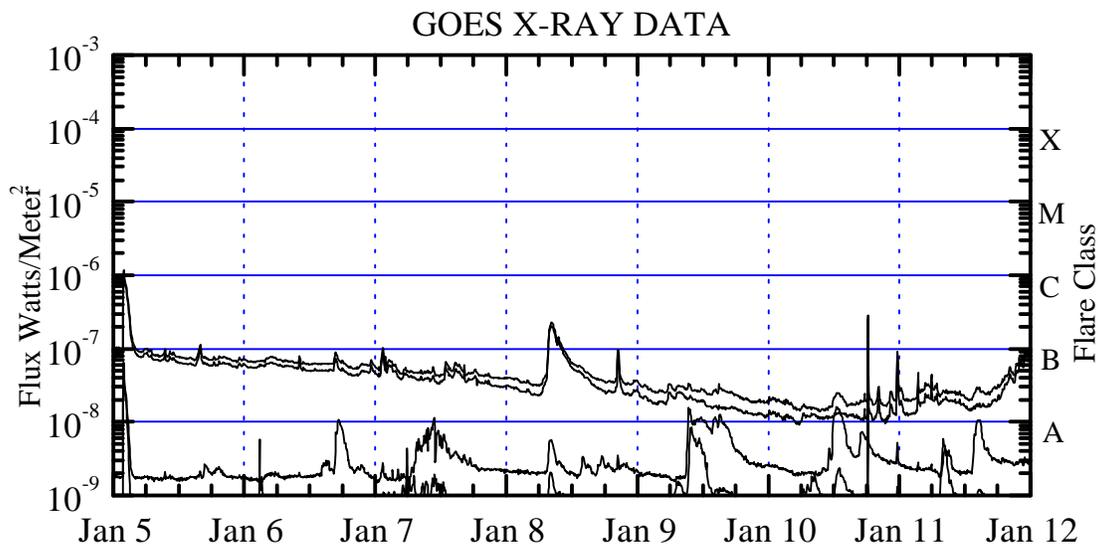
Electrons plot contains the five-minute averaged integral electron flux (electrons/ cm²-sec-sr) with energies greater than 2 MeV at GOES-9.

H_p plot contains the five minute averaged magnetic field H component in nanoteslas (nT) as measured by GOES-9. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

K_p plot contains the estimated planetary 3-hour K-index (derived by the USAF 55th Space Weather Squadron) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA and Heartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC) and the US Geological Survey. These may differ from the final K_p values derived from a more extensive network of magnetometers.

The data included here are those now available in real time at the SWO and are incomplete in that they do not include the full set of parameters and energy ranges known to cause satellite operating anomalies. The proton and electron fluxes and K_p are "global" parameters that are applicable to a first order approximation over large areas. H_{parallel} is subject to a more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.





Weekly GOES Satellite X-ray and Proton Plots

Proton plot contains the five minute averaged integral proton flux (protons/ $\text{cm}^2\text{-sec-sr}$) as measured by GOES-9 (W135) for each of the energy thresholds: >1 , >10 , >30 and $>100 \text{ MeV}$. P10 event threshold is 10 pfu (protons/ $\text{cm}^2\text{-sec-sr}$) at greater than 10 MeV.

X-ray plot contains five minute averaged x-ray flux (watts/ m^2) as measured by GOES 8 and 9 in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

